Supplementary Information for

Dishonesty is more affected by BMI status than by short-term changes in glucose

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Supplementary Information Text

Effect of breakfast manipulation on blood glucose and hunger levels

In addition to the main analyses presented in the manuscript, we ran a regression analysis testing the influence of breakfast manipulation and BMI status on the change in blood glucose and hunger over time, controlling for gender. Results confirm that the glucose level increased significantly in the Sated group compared to Fasted (p<0.001), with no significant difference between obese and lean subjects (p=0.199, see Table S2). Separate regressions confirm the significant effect of breakfast manipulation on both lean and obese subjects (p<0.001 in both cases, see Table S2). Replicating this analysis for the change in hunger index over time, we show that hunger decreases significantly more in the Sated group compared to the Fasted group (p<0.001) and this shift is the same for obese and lean subjects (p=0.668, see Table S3). The same effect is found when considering each sub-sample separately (p<0.001 in both cases). Wilcoxon signed-rank tests indicate that the index decreases between time 1 and time 2 in the Sated group (p<0.001 for all, lean and obese subjects), while it increases in the Fasted one (p<001 in all cases).

We repeated the main analyses for females and males separately and confirmed the overall results. As for the overall subject pool, baseline blood glucose levels measured at the beginning of the experiment (Time 1) do not differ between groups either for females (Fasted: 89.04 mg/dl, S.D.=8.52; Sated: 87.93 mg/dl, S.D.=10.45; two-sample Mann-Whitney test: z_{91}=0.969, p=0.332) or for males (Fasted: 90.46 mg/dl, S.D.=9.68; Sated: 92.62 mg/dl, S.D.=10.77; two-sample Mann-Whitney test: z_{55}=-0735., p=0.462). Baseline hunger index score is also similar across groups in both female (Fasted: 6.27, S.D.=1.82; Sated: 6.39, S.D.=1.48; M-W test: z_{91}=-0.054 p=0.957) and in male subsamples (Fasted: 7.09, S.D.=1.44; Sated: 7.31, S.D.=1.43; M-W test: z_{55}=-0.672 p=0.501). As expected, blood glucose levels differ between fasted and sated subjects in both female (Fasted: 87.40 mg/dl, S.D.=7.98; Sated: 123.30 mg/dl, S.D.=24.10; M-W test: z_{91}=-7.364 p<0.001) and male subsamples (Fasted: 87.78, S.D.=11.14; Sated:134.82, S.D.=20.32; M-W test: z_{55}=-6.331 p<0.001). So does the hunger index score (Female subsample: Fasted: 7.18, S.D.=1.73; Sated: 1.81, S.D.=1.77; M-W test: z_{91}=9.774 p<0.001; Male subsample Fasted: 7.46, S.D.=1.49; Sated: 2.69, S.D.=2.26; M-W test: z_{55}=-0.423 p=0.672).

Both females and males obese subjects have a slightly but significantly higher baseline blood glucose level than their respective lean counterparts (females: M-W test: z_{91}=--3.774 p<0.001; males: z_{55}=-3.085 p=0.02). Differences in baseline hunger levels between obese and lean are more prominent in males (M-W test: z_{55}=2.066 p=0.0389) than in females (M-W test: z_{91}=0.874 p=0.382). Obese females maintain a higher glucose levels at time 2 compared to their lean counterparts (M-W test: z_{92}=-2.583 p=0.01) but not males (M-W test: z_{55}=-1.391 p=0.164). When analysing the two subsamples separately no difference in hunger levels is found between lean and obese sated subjects (females: M-W test: z_{93}=0.950 p=0.342; males M-W test: z_{55}=1.572 p=0.342).

As expected, blood glucose level increases after breakfast consumption in both sated female and sated male subsamples (Wilcoxon signed-rank tests, females: p<0.001 for all, lean and obese, respectively; males: p<0.05 for all, lean and obese), while the decrease in glucose levels observed in the overall fasted group between time 1 and time 2 becomes less significant in the two separate subsamples (Fasted females, all: z_{46}=-2.266 p=0.0235; lean: z_{23}=-1.779

p=0.0754; obese: z_{22}=-1.453 p=0.146; Fasted males, all: z_{27}=-1.688 p=0.091; lean: z_{18}=-1.151 p=0.250; obese: z_{8}=-0.773 p=0.440).

Screenshots of the die task *(Translated from French)*

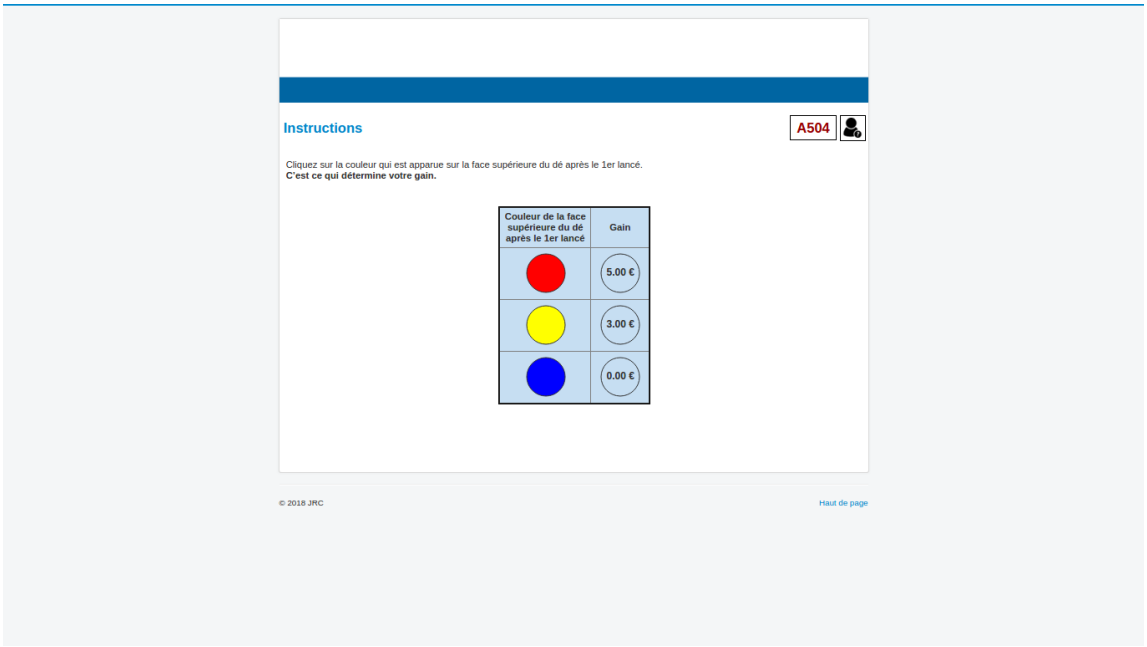
Screenshot 1

For answering the previous questionnaire you will receive an additional payoff of either €0, €3 or €5. This amount will be determined by rolling the die within the cup that has been placed on your desk. You are invited to roll the die by shaking the cup. After each roll, look at the colour of the top side of the die through the lid of the cup.

Only the first roll determines your payoff. The second roll only serves to make you sure that the die is working properly. Of course, you may roll the die more than twice, but only the first roll counts for your payoff. The possible payoffs are indicated below.
Now, roll the die twice. Keep in mind these outcomes. Then, press OK.

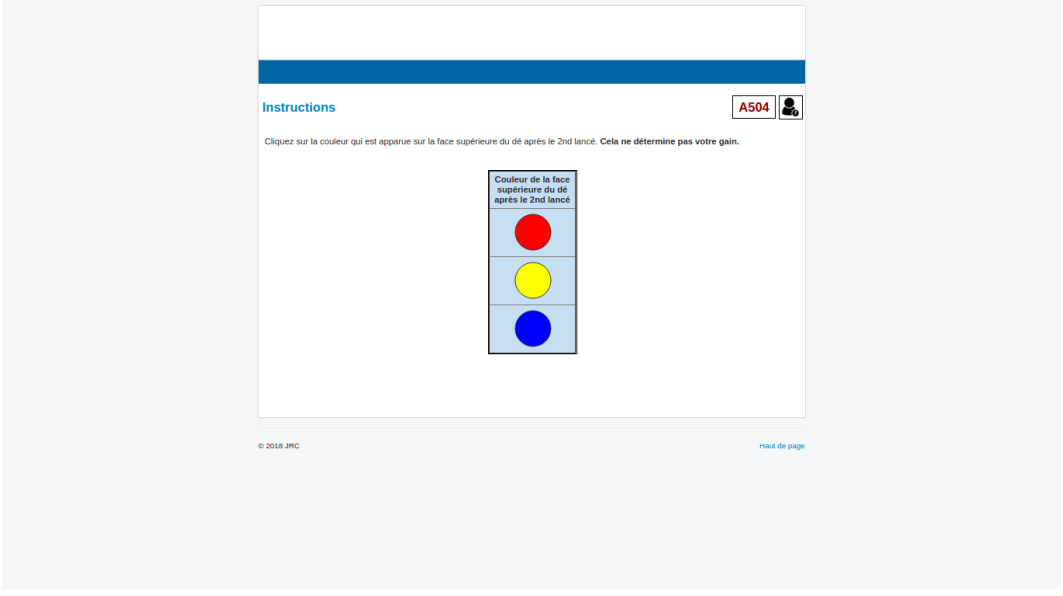
Screenshot 2

Press the colour corresponding to the top side of the die after the 1st roll. **This will determine your payoff**.



Screenshot 3

Press the colour corresponding to the top side of the die after the 2nd roll. **This will not determine your payoff.**



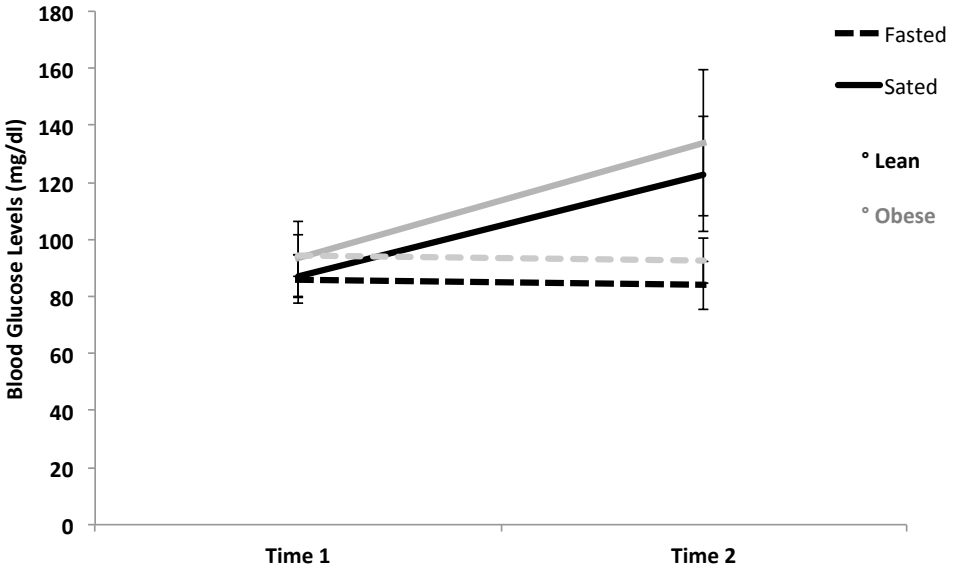


Figure S1. Evolution of blood glucose levels over time, for lean and obese subjects. Shift in blood glucose levels (in mg/dl) of lean and obese subjects between Time 1 (baseline level) and Time 2, in Sated and Fasted Conditions.

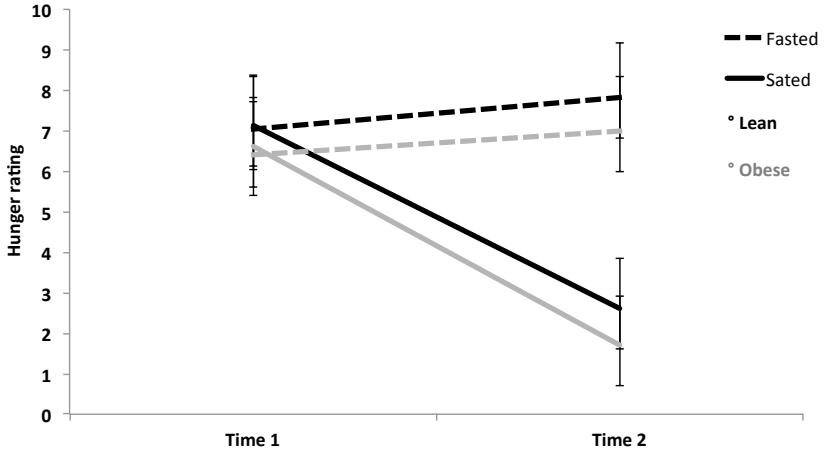


Figure S2. Evolution of the hunger index over time, for lean and obese subjects. Shift in mean hunger index of lean and obese subjects between Time 1 (baseline level) and Time 2, in Sated and Fasted Conditions.

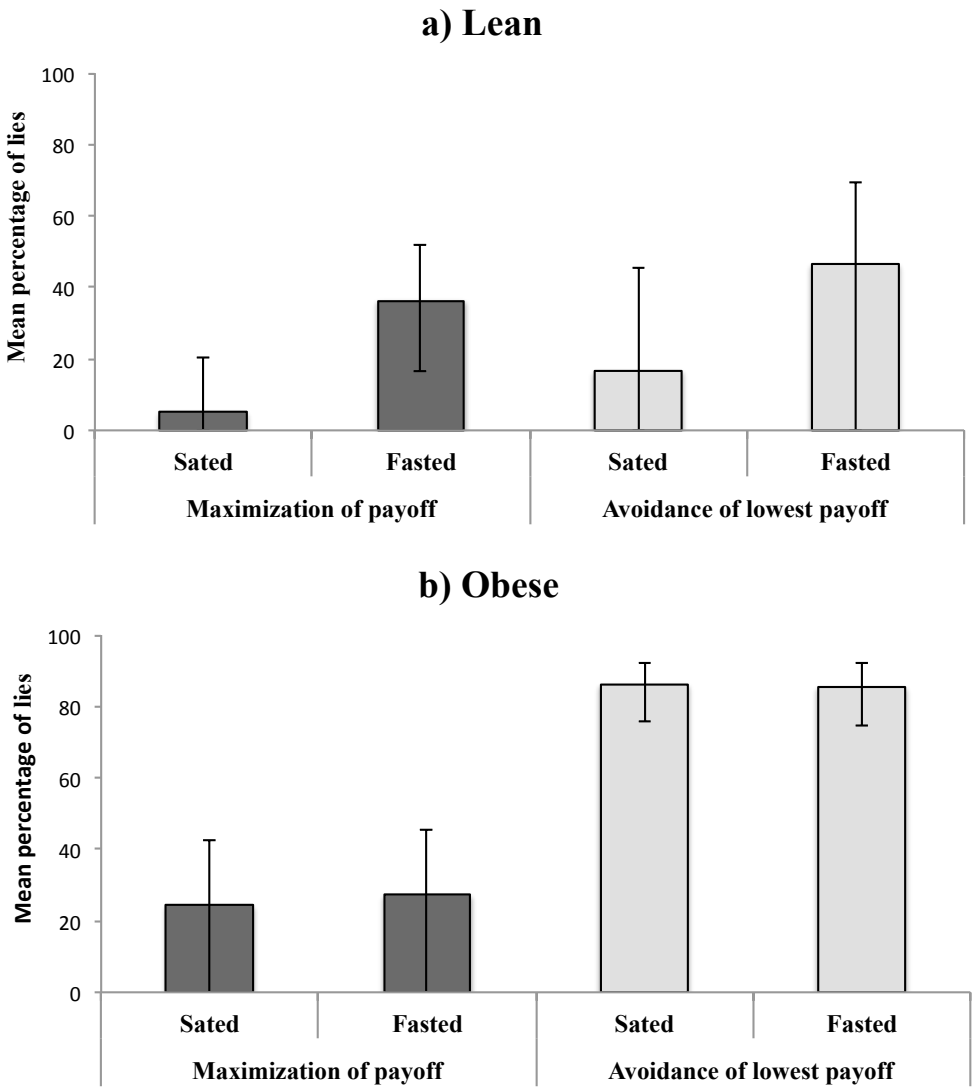


Figure S3. Estimated mean percentage of lies, by condition and BMI status (Females). Panel a) is for lean subjects and panel b) for obese subjects. Bars indicate 95% confidence intervals.

Table S1. Subjects' mean characteristics, by condition and BMI status

Characteristics	Lean		Obese	
	Fasted (1)	Sated (2)	Fasted (3)	Sated (4)
Body Mass Index	21.02 (2.20)	21.14 (2.17)	34.69(4.66)	34.62 (3.90)
Glucose – Time 1	86.02 (8.44)	87.02 (7.38)	94.34 (7.30)	93.21 (13.25)
Glucose – Time 2	83.81 (8.35) ***	122.93 (20.27)	92.56 (7.94) ***	133.91 (25.62)
Hunger– Time 1	7.00 (1.40)	6.96 (1.35)	6.02(1.98)	6.48 (1.98)
Hunger – Time 2	7.61 (1.57) ***	2.52 (2.01)	6.86 (1.68) ***	1.70 (1.95)
Perc. of females	55.81 (50.25)	52.38 (50.55)	71.87 (45.68)	72.73 (45.22)
Age	29.60 (11.74)	33.38 (12.64)	36.31 (16.87) **	46.91 (16.52)
Weekly spending	1.72 (1.24)	1.74 (1.06)	2.09 (1.44)	2.76 (1.52)
Educ. attainment	4.93 (1.08)	4.90 (0.98)	4.47 (1.50)	4.76 (1.35)
Perc. of students	39.54 (49.47)	30.95 (46.79)	31.25 (47.09)	12.12 (33.14)
Number of observations	43	42	32	33

Notes: the Table reports mean values with standard deviations in parentheses. Blood glucose level is expressed in mg/dl. ***, **, * indicate significance at the 0.1, 1%, 5% level, respectively, in two-sided Mann-Whitney rank-sum tests (BMI, Blood glucose, Hunger index, Age) and two-sided *t*-tests (other variables) comparing the Fasted and Sated groups in each BMI category (Lean, Obese).

Table S2. Determinants of blood glucose levels in Time 2 compared to Time 1

Dependent variables	All subjects (1)	Lean (2)	Obese (3)
Obese (BMI ≥30)	2.999	-	-
	(2.323)		
Sated Condition	33.182***	30.959***	36.087***
	(2.214)	(2.695)	(3.722)
Female	-5.375**	-5.430**	-5.442
	(2.211)	(2.647)	(3.918)
Constant	6.996***	8.124***	8.568**
	(1.678)	(1.716)	(2.893)
Number of observations	150	85	65
F	88.05	80.95	50.76
p>F	<0.001	<0.001	<0.001
R^2	0.614	0.635	0.599

Notes: The Table reports the coefficients from Ordinary Least Square models. The dependent variable is the difference between blood glucose level in time 2 and blood glucose level in time 1. Robust standard errors are in parentheses. Model (1) pools all the data; models (2) and (3) split the sample by BMI status. ***, **, * indicate significance at the 0.1%, 1%, 5% level, respectively.

Table S3. Determinants of the difference in hunger index in Time 2 compared to Time 1

Dependent variables	All subjects (1)	Lean (2)	Obese (3)
Obese (BMI ≥30)	0.109	-	-
	(0.254)		
Sated Condition	3.730***	3.669***	3.818***
	(0.249)	(0.327)	(0.387)
Female	0.098	0.246	-0.147
	(0.246)	(0.322)	(0.380)
Constant	0.919***	0.868***	1.161***
	(0.188)	(0.203)	(0.301)
Number of observations	150	85	65
F	76.09	63.07	49.69
p>F	<0.001	<0.001	<0.001
R^2	0.608	0.611	0.606

Notes: The Table reports the coefficients from Ordinary Least Square models. The dependent variable is the difference between the hunger index in time 2 and the hunger index in time 1. Robust standard errors are in parentheses. Model (1) pools all the data; models (2) and (3) split the sample by BMI status. ***, **, * indicate significance at the 0.1%, 1%, 5% level, respectively.

125 **Table S4.** Two-sided *p*-values from exact Fisher tests for each reported outcome

126 comparing groups. Significant values are in italics.

	All individuals			Females			Males		
Reported outcome	Blue (€0)	Yellow (€3)	Red (€5)	Blue (€0)	Yellow (€3)	Red (€5)	Blue (€0)	Yellow (€3)	Red (€5)
Lean subjects Sated *vs*. Fasted	0.427	0.342	0.131	0.307	0.348	*0.042*	1.000	1.000	1.000
Obese subjects Sated *vs*. Fasted	1.000	0.801	0.620	1.000	1.000	1.000	1.000	1.000	0.620
Fasted Lean *vs*. Obese	0.127	0.207	1.000	0.348	0.227	0.772	0.530	1.000	0.670
Sated Lean *vs*. Obese	0.056	0.476	0.492	*0.020*	0.774	0.140	1.000	0.675	1.000

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Table S5 Determinants of the reported outcome of the first die roll

Dependent variables	All subjects (1)	Lean (2)	Obese (3)	Females (4)	Males (5)
Sated - Lean	*Ref*			*Ref*	*Ref*
Fasted - Obese	0.912*	-	-	1.085*	1.802*
	(0.371)			(0.450)	(0.860)
Fasted - Lean	0.688*	-	-	1.090*	0.385
	(0.350)			(0.442)	(0.683)
Sated - Obese	0.701*	-	-	1.068**	0.264
	(0.307)			(0.379)	(0.630)
Male	0.337	-	-	-	-
	(0.211)				
Sated - Female		*Ref*	*Ref*		
Fasted - Male	-	0.920	1.050	-	-
		(0.521)	(0.708)		
Fasted - Female	-	0.979*	0.049	-	-
		(0.475)	(0.553)		
Sated - Male	-	0.782*	-0.285	-	-
		(0.370)	(0.513)		
Spending category	-0.026	0.029	-0.044	0.146	-0.332
	(0.091)	(0.134)	(0.161)	(0.120)	(0.181)
Age	0.089*	0.093	0.087	0.099*	-0.087
	(0.041)	(0.099)	(0.052)	(0.046)	(0.143)
Age square	-0.001*	-0.001	-0.001	-0.001*	0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
Educational attainment	-0.247*	-0.216	-0.317*	-0.272*	-0.280
	(0.098)	(0.142)	(0.161)	(0.122)	(0.196)
Student	0.860**	1.065*	0.848	0.979**	0.365
	(0.297)	(0.447)	(0.527)	(0.378)	(0.675)
Hunger shift	0.061	0.039	0.124	0.050	0.124
	(0.065)	(0.088)	(0.106)	(0.077)	(0.145)
Number of observations	150	85	65	93	57
Log pseudolikelihood	-133.418	-79.137	-47.278	-82.431	-43.764
Wald χ^2	24.199	15.093	14.088	20.491	14.231
$p>\chi^2$	0.007	0.088	0.119	0.015	0.114
Pseudo-R^2	0.083	0.087	0.130	0.111	0.140

Notes: The Table reports the coefficients from ordered probit models. Standard errors are in parentheses. Model (1) pools all the data; models (2) and (3) split the sample by BMI status and models (4) and (5) split the sample by gender. Sated lean subjects are used as the reference group for M1, M4-M5, and sated female subjects for M2-M3. Spending category is based on mean weekly expenses excluding rents (1 for 0-€150, 2 for €150-€300, 3 for €300-€450, 4 for €450-€600, 5 for €600-€750, 6 for €750 and more). Educational attainment can take six values (1 for primary education, 2 for secondary education, 3 for high school, 4 for vocational training, 5 for some University to Bachelor degree, and 6 for Master degree and above). ***, **, * indicate significance at the 0.1%, 1%, 5% level, respectively.